

50X1-HUM

CENTRAL INTELLIGENCE AGENCY  
INFORMATION REPORT

SECRET  
SECURITY INFORMATION

50X1-HUM

COUNTRY USSR/Germany (Soviet Zone)  
SUBJECT Scientific Progress in the USSR

REPORT

DATE DISTR. 1 9 December 1953

NO. OF PAGES 13 50X1-HUM

DATE OF INFO.

REQUIREMENT

PLACE ACQUIRED

REFERENCES

50X1-HUM

THE SOURCE EVALUATIONS IN THIS REPORT ARE DEFINITIVE.  
THE APPRAISAL OF CONTENT IS TENTATIVE.  
(FOR KEY SEE REVERSE)

50X1-HUM

SECRET 50X1-HUM

STATE	#x	ARMY	#x	NAVY	#x	AIR	#x	FBI		AEC					
-------	----	------	----	------	----	-----	----	-----	--	-----	--	--	--	--	--

Washington Distribution Indicated By "X"; Field Distribution By "#".

50X1-HUM

S E C R E T

SECURITY INFORMATION

REPORT

COUNTRY : USSR/Germany (Soviet Zone)  
 SUBJECT : Scientific Progress in the USSR

DATE DISTR. 30 OCT 53

NO. OF PAGES 12

PLACE ACQUIRED : [REDACTED]

NO. OF ENCLS.  
(LISTED BELOW)

DATE ACQUIRED [REDACTED]

SUPPLEMENT TO  
REPORT NO.

50X1-HUM

DATE OF INFORMATION : [REDACTED]

THIS IS UNEVALUATED INFORMATION

50X1-HUM

# STATUS OF SOVIET ELECTRONICS RESEARCH PRIOR TO THE ARRIVAL OF THE GERMAN SPECIALISTS

1. The following information [REDACTED] in vacuum tube development and some fields of vacuum tube application. The chronological period covered [REDACTED] at the Oberspreewerke, Berlin, from 1945 to 1946, and at Institute 160 in Fryazino from 1946 to 1952. 50X1-HUM
2. The German specialists employed at the Oberspreewerke, Berlin, were occupied with the task of achieving the level of American development. This was done by copying or improving prototypes produced in the United States and Western European countries. Only in the field of lighthouse tubes (Scheibenroehren) did the Soviets follow German development by the introduction of metal ceramic tube techniques. On the whole, efforts were directed primarily toward approximating American techniques. The engineers employed at OSW worked on the re-development and completion of the fabrication data and special equipment for the following tubes (for radar):
  - a. 10 cm. impulse magnetrons
  - b. 3 cm. impulse magnetrons
  - c. Rectifier tubes (Sperrroehren)

S E C R E T

SECURITY INFORMATION

50X1-HUM

S E C R E T

- 2 -

- d. Impulse tubes (triodes and tetrodes)
- e. Cathode-ray tubes (5D21)
- f. Receiving and amplifying tubes, (6AG7, 6AG7, 6J6)
- g. Klystrons (723A/B, 726A/B. as oscillator tubes for radar reception)

American tubes of these types served as prototypes. Identical tasks were assigned for the German metal ceramic tube application.

3. The most important assignments at OSW in the field of vacuum tube application were the development of the followings:

- a. A system for long distance navigation (Fernnavigation).
- b. A system for close navigation (Nahnavigation).
- c. A short-wave long-distance direction finding system (Wullenwever Kurswellenfernpeilanlage).
- d. A micro-wave relay system for pulse phase modulation (Richtverbindungsgeraete fuer Impulsphasenmodulation).
- e. Measuring equipment and components in the micro-wave field (10 and 3 cm.).
- f. Special measuring equipment for use in vacuum tube development.

4. Approximately the same stage of development prevailing at OSW existed at Fryasino upon the German specialists' arrival, and the small group of Soviet development engineers at Institute 160 were working on the same or similar problems. Some of the development data from OSW had preceded [ ] and the Soviets were using this data to develop vacuum tubes. They had also been assigned the task of developing crystal detectors (Silisiumdetektoren) for the 10 and 3 cm. fields from American types. Very few Soviet personnel were detailed to tube development [ ] in Fryasino. About thirty engineers, as well as some designers and machinists, were occupied with this task. The entire institute had only several hundred employees. Laboratory equipment, such as measuring and testing equipment, was deficient in all respects. Only a few common measuring instruments of American or German origin were available, and some of these were out of order. Similar circumstances prevailed regarding facilities, such as vacuum pumps and other equipment, for vacuum tube fabrication.

50X1-HUM

50X1

50X1-HUM

5. The development of the following were underway [ ] at Institute 160:

50X1-HUM

- a. A continuous line magnetron (Dauerstrichmagnetron) under the direction of ZUSMANOVSKIY. This was the only project not based on American development.
- b. Ten-centimeter impulse magnetrons for radar equipment under the direction of FEDOSIYEV. This was an American type based on data prepared at OSW.

S E C R E T

S E C R E T

- 3 -

50X1-HUM

- c. Ultra-short-wave transmitting triodes and tetrodes with outputs of about 100 watts. Mrs. KRAKAU developed the tubes.
- d. A klystron for the 10-centimeter band, similar to the American klystron No. 2K45. The engineer was Mrs. YEFTOFEVA.
- e. Receiver and amplifier tubes such as 6L6 (Soviet 6/Б), 6V6, and a mutual conductance (steilen) English pentode similar to the American 6AC7, and the rectifier 6X6.
- f. Receiver and special tubes for radar equipment from American types, as well as thyratrons from American types. The engineer was Miss VOGELSOHN.
- g. Cathode-ray tubes from data produced at OSW.
- h. Iconoscopes and kinescopes from American types.
- i. Special tubes for the impulse keying (impulstastung) of magnetrons, under the direction of STROGANOV.

Other projects underway in the USSR at this time included the development and manufacture of the 723A/B klystron in the vacuum tube plant in Leningrad, and the development and manufacture of metal ceramic tubes in Novosibirsk. The former was produced from data supplied by OSW and was under the direction of PODGURSKIY.

the first tubes made in each case were brought to Fryazino for testing and appraisal. 50X1-HUM

6. It may be concluded, therefore, that Soviet activity was concerned primarily with the copying of American tubes. In a few cases German tubes were copied, such as the metal ceramic tube RV12P2000 with an octagonal base. 50X1-HUM

#### GERMAN CONTRIBUTION TO SOVIET RESEARCH AND DEVELOPMENT

50X1-HUM

7. The German specialists were integrated into the existing projects almost immediately after their arrival. Dr. STEIMEL given the task of assigning the Germans to these projects according to their ability. also asked to make a recommendation regarding vacuum tube production, i.e., to select those American tubes which were absolutely necessary for equipment development. This selection was, in general, the basis for the work of the next few years. 50X1-HUM 50X1-HUM
8. A large group of Germans was detailed to the measuring equipment field. Equipment essential to the examination and testing of tubes was built, ranging from the simplest to the most complex apparatus. Measuring devices for the micro-wave field were non-existent, and many Germans were engaged in this work. Other groups worked on special measuring equipment for the development of klystrons, magnetrons, and crystal detectors. Another group worked on cathode-ray tubes. German mechanics were assigned to work in the workshops. German glass-blowers went to work in their field. In this way the development capacity of Institute 160 was expanded to several times its previous level.

S E C R E T

S E C R E T

- 4 -

50X1-HUM

9. Within approximately two years, all laboratories had sufficient measuring equipment and special devices to engage in really worthwhile development. Needless to say, it was still based on American data taken from published material.
10. The next few years saw the completion and improvement of these projects, as well as the continuing education of the Soviet personnel. [redacted] at Institute 160, the indigenous personnel in the laboratories increased five times the original number, and in some cases, the increase was even greater. This growth was still taking place [redacted]. The work of Germans in the USSR was mainly responsible for transforming Institute 160 from a factory devoted primarily to vacuum tube production to a technical complex which would compare favorably to a similar plant in West Germany. It must be taken into consideration, of course, that the output per employee is smaller than that of the West. However, output per employee is less important in the USSR than over-all total production. The Soviets learned from the Germans how to outline and resolve a problem, and the Germans' help in copying American equipment was also of value.

50X1-HUM

50X1-HUM

Estimate of Soviet Capabilities Without German Aid

50X1-HUM

11. [redacted] the Soviets could not have attained the same level of development without [redacted] help because they had some engineers who had been trained in Germany [redacted] and who were quite competent in vacuum tube techniques. Naturally, it would have taken much longer. The time required to overcome the lead of the West was shortened appreciably by the commitment of the Germans. For example, Institute 160 had, [redacted] about thirty development engineers, of whom three were outstanding and four were above average. The Germans greatly increased this number. Previously there had been little actual work performed because of the Soviet's preference for discussions rather than work. With the Germans, however, work was started almost at once, and projects were completed within a reasonable time. It is rather difficult to estimate how long it would have taken Institute 160 to attain its present level without German assistance. The work completed with two years of the German specialists' aid would probably have taken the Soviets alone from five to ten years longer. The status of the institute in 1952 would probably have been reached within ten to fifteen years.
12. In 1951, the Soviets were told by their respective superiors to prepare for the eventual departure of the Germans, and each department head received orders to gradually reduce German participation in each project. As soon as the Soviets took over a project, it became evident that the work progressed more slowly. There were, in fact, several projects which came to a standstill, in which cases the Germans involved were called back and asked for advice. In general, all projects gradually got underway again, but with a much slower tempo. [redacted] the work [redacted] probably took about three times as long. The quality of the work also decreased, but may have been regained [redacted].

50X1-HUM

50X1-HUM

50X1-HUM

50X1-HUM

50X1-HUM

50X1-HUM

50X1-HUM

50X1-HUM

S E C R E T

S E C R E T  
- 5 -

50X1-HUM

13. It is certain that at least some of the work at the institute will continue more slowly now that the German specialists have left, but this will be compensated for to some extent by the continuing improvement of the Soviet personnel. Among the graduates of the universities and higher schools are to be found a great number of outstanding engineers. Because of the fact that the most needed positions are elevated to the highest paid, a stimulus for prospective engineers and technicians is achieved so that their number grows from year to year. In this way all of the intelligentsia is drawn to the technical fields. It is entirely possible that within five to ten years the number of engineers in the USSR will exceed that of all other countries combined. It is at this point that Soviet research and development will at least parallel that of the West if, in fact, it does not achieve pre-eminence.

#### Utilization of German Abilities

14. According to the Soviet conception, the German abilities were well utilized. Much more could have been achieved from the Germans, however, if the Soviets had taken the specialists' mentality into consideration to a greater extent. After a short time in the USSR, there was a noticeable apathy among the Germans. Only concern for their families and some technical interest kept them at their work. Many of them withheld their efforts if it was not conspicuous. Whereas many Germans made patent applications in the first few years, only a few did so in the last years.
15. The Germans received larger salaries than the Soviets, but they did not receive any special premiums for their work. 50X1-HUM

development of a micro-wave relay system with pulse phase modulation and the other was the development of crystal detectors. Both of these projects were distinguished with the Stalin prize, but the Germans who worked on them received no special honorarium. The lack of freedom and the continual personal meane and fear also contributed to the lack of enthusiasm for work. Voluntary efforts to complete a project were entirely lacking in the last few years. Work was begun more or less promptly with the sound of the bell, and everyone stopped promptly when the quitting bell sounded.

16. Important decisions during the first few years were hardly ever made without asking the German specialists for advice, but in later years this advice was obtained secretly or not at all. the Soviets tried to be completely independent. Nevertheless, the plans for the individual laboratories were still discussed with the German specialists. However, these discussions were held in such a way that an overall grasp of the plant plan was not possible. 50X1-HUM

#### QUALITY OF SOVIET RESEARCH AND DEVELOPMENT

##### Comparison of Soviet and German Development During the War

17. In the fields of vacuum tube techniques, communication techniques, and radar, as well as in related fields such as navigation, etc., Soviet development in general was far behind German development.

S E C R E T

S E C R E T  
- 6 -

50X1-HUM

The status of the Soviet laboratories upon [ ] arrival is a criterion; Soviet measuring equipment or even simple measuring instruments were not available. Such equipment [ ] was half American and half German. In addition, there were a number of devices brought along from Germany. All of our component requirements, such as resistors, condensers, coil cores (Spulenkernen) of high frequency iron and transformer plates, were filled from German booty stocks [ ]

50X1-HUM

50X1-HUM

50X1-HUM

18. It can be seen from the foregoing that Soviet development in the electronics field was quite backward until the period of the war. The founding of the Radar Committee during the war, however, is evidence that the Soviets recognized the importance of this field, and that they had begun to assign qualified individuals to this problem.

Extent of Inefficiency Under the Soviet System

19. [ ] the disadvantages of the Soviet system, but also some of the advantages. The chief advantage of Soviet research and development lies in the unlimited funds at its disposal. When a project is considered important, unlimited funds are provided for its completion. Because of this fact, it is possible for scientific fields which have heretofore been untouched to be explored and expanded so that discoveries and improvements of great import may accrue to the USSR. In this respect, planning for the current year is no hindrance. Important projects can be assumed during the current year and if necessary, with the approval of the ministry involved, less important projects can be set aside. 50X1-HUM
20. Although planning is no hindrance in this respect, it can be in other respects. For example, when special materials or components are required, they must be requisitioned or especially produced. Because these components have not been included in the plan, they will not be available for some time. Deliveries taking up to a year or over are no rarity in such cases. Similar difficulties occur even within planned projects when special parts are required which must be produced in small quantities and which are not included within that plant's plan. Such difficulties often hindered the development work in Institute 160. [ ] ordinary screws (DIN M4 or M8) were not procurable, and they had to be manufactured in the institute. 50X1-HUM
21. Another obstacle to scientific development is the necessity of setting a specific time for the completion of a project so that it may be included in the institute's plan. As exact dates often cannot be set, and the plan must not only be fulfilled but overfulfilled, the plan is calculated to include safety factors. The laboratory chief includes a 100 per cent safety factor in his calculation. The department head includes his own 100 per cent safety factor. The plant or institute director does the same, and thus the plan is given to the responsible ministry with a safety factor of some 300 to 400 per cent. It should be self-evident that this feature does not improve employee morale. Even when an engineer is actually at the completion of his work,

S E C R E T

S E C R E T  
- 7 -

50X1-HUM

he will prolong the completion and, in some cases, may work unnecessary overtime to fulfill the plan and thus earn additional money. The same situation applies to the Soviet laborer, whether mechanic, toolmaker, or glass blower. He must, in order to earn sufficient money, exceed his norm. The system used in exceeding the norm in development work is the following. Every part has a specific period of time allotted to its completion. The part can be finished in that time, but not enough within the time limit to earn a premium. The mechanic, therefore, reports the completion of three or four parts, thus exceeding his norm and getting more money. The laboratory certifies the receipt of three or four parts, although in reality only one part was received. The "surplus" parts are consumed in the development process. This system, which is actually a fraud, is common in all development institutes [redacted]

50X1-HUM

22. A further disadvantage of Soviet organization is the lack of individual responsibility. Every individual endeavors to shift the responsibility for a mistake to another individual. Each person attempts to secure himself against mistakes. Even the director of an institute seeks to evade responsibility, in that he continually asks for explicit instructions from the appropriate ministry instead of making the decisions himself.

#### Plan Fulfillment Under the Soviet System

23. [redacted] all plans are generally 50X1-HUM fulfilled. Of course, the actual goal is not always really achieved. The main objective is that the required part be reported completed. In many cases there is no one who proves the completion of a project, or who could prove it if he wanted to do so. A clever department head knows how to evade such an inspection, or he can demonstrate the apparatus and, with the help of some technical tricks, pass the inspection. The acceptance commission, made up of individuals from the same institute, will thus notice nothing wrong with the device, either accidentally or on purpose.
24. There is always a possibility that the ministry might ask for some piece of apparatus which has been reported as completed. Delivery is then evaded by reporting that the apparatus in question is essential to complete the development of another apparatus. By this means, the time available for a certain project is often doubled.
25. There are cases, of course, where a project cannot be fulfilled and where its non-fulfillment cannot be falsified. This case must then be reported to the ministry and a thorough explanation given. If this is done in the prescribed manner, it is still possible that the project can be noted as completed on the plan.

#### Concentration of Manpower And Research Facilities

26. An authoritarian state is obviously in an advantageous position in being able to concentrate any number of personnel and other

S E C R E T



S E C R E T

- 8 -

50X1-HUM

resources upon a particular project. All that is required is a simple order. In a democracy, however, if it had been decided that a project must be carried out in a geographically unfavorable location, it might be difficult to assemble the necessary personnel despite favorable monetary remuneration, particularly if climatic conditions were detrimental to health. These factors are not taken into consideration in the USSR. An order is sufficient to concentrate manpower and material at a prescribed location. Time is not taken into consideration either. No Soviet citizen would be especially surprised to receive an order to leave his place of work in order to start work at another location a thousand or more kilometers removed on the following day.

#### Concentration Upon High-Priority Projects

27. Concentration upon a particularly high-priority project, to the detriment of lower priority projects, would depend upon the importance placed upon the former. Obviously, all civilian needs are immediately revocable when military demands arise. [redacted] 50X1-HUM  
[redacted] in special cases the Soviet government would stop production of all civilian goods. In this respect there is not the slightest regard for civilian requirements. As evidence of this [redacted] the conditions prevailing during the last war. Men, women, and children who were not working in war production industries received a totally inadequate food ration, which in many cases was even then theoretical. Furthermore, to insure that the industrial workers did not give the "non-productive" family members any food, they were required to eat their rations in the plant as much as possible. 50X1-HUM
28. Contemporary propaganda in the USSR reiterates this concept. Although the level of living in the USSR has risen considerably since 1946, the population is told that a further rise is not possible because of the menace of the capitalistic world. They are told that all efforts must be devoted to military armament and that there is therefore a continually decreasing amount which can be spared for civilian consumption. The majority of the population accepts this explanation as logical and correct. Even a sharp deterioration in civilian production would be ungrudgingly accepted by the Soviet population if the government would call on the nationalistic spirit and state "Mother Russia is in danger."

#### Governmental Influence on Scientific Endeavors

29. The progress of all work in the institute was continually supervised by the responsible ministry through the chain of command. Even the ministry was supervised, [redacted] 50X1-HUM  
Political assemblies (sobraniye) were continually held wherein the entire labor force was impressed with the importance of their work for socialistic purposes. In addition to these assemblies, which were held about once a month, there were weekly meetings (miting) of each department, at which time political developments taken from the newspaper were discussed in relation to the importance of fulfilling the plan. These

S E C R E T

S E C R E T

- 9 -

50X1-HUM

meetings were also used to inform the workers of the necessity of fulfilling the projects on which they were working. The ministry would also publish some article showing how a particular task fitted into the over-all progress of the USSR. At the same time various rumors would be disseminated which did not appear in the newspapers, such as the statement that bacteria had been released over Moscow by the Americans. Soviet policy requires that the population remain in a continual state of agitation. The necessity of continual exertion on the part of all workers is stressed, if the glorious successes of the USSR are to be upheld against the envious efforts of the West. As a result, the Soviet government succeeds in combating the inherent inertia of the average Soviet worker or engineer.

30. When a project is first formulated, the ministry endeavors to establish very high standards. Most of the specifications are taken from American publications. In many cases the ministry would set up figures to exceed the American data by a factor of ten, thereby setting requirements often technically impossible to achieve. In other cases attempts were made to exceed the American characteristics by only a small amount. This was done by not taking average results, but by recording the maximum achievement under optimum conditions. The result would then be propagandized as showing the progress of Soviet science in respect to the rest of the world. In practice, however, the ministry was usually willing to reduce its requirements to the American values.
31. As far as possible all projects are assigned to specialists in the required fields. In each case the chief of the development laboratory or the development department is a specialist. The selection of such an individual is, of course, much simpler if the person is politically orientated toward Communism or is a Party member. Political beliefs are always the deciding factor, even if the Party member is less capable technically. However, since there are not enough technical members associated with the Party, the majority of technical leadership is non-Party. Therefore, in order that the Party can exert its influence in the plant, either the department head or his deputy must be a Party member. It is the department head's responsibility to supervise the progress of the project and the fulfillment of the plan and to handle all administrative matters, including personnel problems. He is also responsible for conducting "meetings" regularly. If the department head or the laboratory chief is a Party member himself, the deputy's position is not of much importance. On the other hand, if either of the former is not a Party member, the deputy's role can be of determinative influence. A non-member department head can make no decisions without consulting his deputy. The Party thus asserts its authority in all research and development projects.

#### Importance of Soviet Personnel Problems

32. [ ] the Soviet worker has a tendency toward laxity and tardiness. Should a department make no special effort to counteract this tendency, all of the department

50X1-HUM

S E C R E T

SECRET

-10-

employees would soon straggle in at all hours of the morning. Even after they have reached their work bench, they would make no efforts to commence work, and should they finally condescend to make such an effort, they would give it up in a second to begin one of their innumerable and endless technical discussions. They can spend an entire morning on a discussion, stopping only for lunch, and then resuming the same discussion in the afternoon. A day thus spent, with no productive effort, is no rarity in Soviet laboratories or offices. Continual supervision is the only solution for this prevalent failing. Strict measures against tardiness must be enforced; careful control of productive effort must be exercised.

33. The Soviet engineer's training is very specialized, i.e., his specialization begins in the higher schools or universities to the detriment of his general basic education. For this reason, most young engineers can be utilized only in a very narrow field; they show no interest in related fields. In general, they are not in a position to formulate the physical requirements of a project, although they can resolve the mathematical formula reliably, with a minimum of effort. Therefore, qualified supervisory personnel in the USSR are difficult to find. The field of medicine is probably the best example of this. There is an outstanding specialist for almost every disease known in the USSR. In order to consult the proper specialist, however, the patient must know the disease with which he is afflicted. Should he have a disease difficult to recognize, he would hardly be able to find a physician capable of making the correct diagnosis. In the medical field, as in the technical, the specialists are all too specialized. A solution to this problem has not yet been formulated in the higher schools of the USSR.

50X1-HUM

#### Quantity Versus Quality

34. The rather prevalent opinion that quality is sacrificed for quantity in the USSR must be qualified. It is true that the outward appearance of all apparatus in the USSR leaves much to be desired. All surface treatment which has nothing to do with the functioning of the apparatus is neglected. Because of this, the apparatus often looks crude in comparison to that of other countries, but it does not signify that its functioning is impaired. On the contrary, quality is always stressed in this respect. The unconditional fulfillment of the plan, however, often makes it necessary that lower quality products are included in the plant's output. It is only a question of time, however, until such deficiencies are discovered. Either quality inspection or the complaints of consumers will bring this faulty material to the attention of a responsible office, and sharp and decisive measures will be taken to correct the lack of quality. The same holds true for the quality control of vacuum tubes. Various tests of the tubes are made according to the American JAN specifications. Tubes which do not meet the specifications are rejected, but despite rejections, the prescribed number of tubes must be produced. It is almost certain that all fabrication industries in the USSR work with a higher rejection rate than the Western countries, because the output is more important in the USSR than the economic cost.

50X1-HUM

SECRET

50X1-HUM

S E C R E T

-11-

THE FUTURE OF SOVIET RESEARCH AND DEVELOPMENT

35. A broad, well-balanced Soviet research and development program is out of the question at present, although they have achieved noticeable results in some fields. The Soviets have, until now, taken the research activity of the rest of the world, appropriating material published in periodicals and books, as a starting point for their own work. They have gone beyond this point in a few cases, achieving some worthwhile results, but in general further development work is restricted to the publications and materiel trickling into the USSR from the Western world. 50X1-HUM
36. [ ] the main advantage of Soviet research and development derives from its independence of economic, or rather financial, considerations. All scientific projects, if they have the slightest trace of eventual importance, can be pursued without regard to costs. The USSR is never hindered in any respects by a lack of capital and Soviet scientists can follow scientific paths which may give only a trace of success. The much-heralded theoretical equalization of status in the USSR was therefore never in evidence in the scientific field. Actuality was diametrically opposed to [ ] expectations [ ] in the USSR. The German concepts of socialism and communism are basically different from the Soviet concepts. In Germany, the basic tenets of these ideologies are the complete equalization of all classes in every respect. In the USSR, on the other hand, the distinction between the laborers and the technically trained engineer is much greater than in other countries. The income of an engineer in the USSR is a multiple of a laborer's wages, whereas in Western countries it is only slightly larger than that of a laborer. The allocation of housing in the USSR suffers from the same class distinctions; all specialists received privileged treatment. This favored treatment of specialists and engineers is the most significant feature of Soviet policy. 50X1-HUM 50X1-HUM
37. One of the preliminary conditions for the furtherance of scientific research and development is the recruiting and training of qualified personnel. In this respect, [ ] consider [ ] the standards of the Soviet educational system. The primary education, i.e., the ten years of pre-university training is quite good. The Soviet student receives a basic fundamental background; mathematics, physics, chemistry, history, and one foreign language. The foreign language studied was formerly German, but it is now English (the language of their most important adversary). In general, education during the formative years is at least equal to the Western countries, particularly in the technical and natural sciences. The stress laid on mathematics, the basic tool of physics, is probably greater in the USSR than in any other country. 50X1-HUM 50X1-HUM
38. Matriculation in a technical college or university is dependent upon the final examination in a secondary school. Only students who have passed their final examination with the award of a gold or silver medal receive permission to attend a higher school. Matriculation in large and well-known technical colleges or universities, e.g., Moscow or Leningrad, is permitted only to

S E C R E T

S E C R E T

-12-

50X1-HUM

those who have received the gold medal. Before they are finally accepted at a university or higher school, the aspirants must pass another examination. A rigorous selection process is thus achieved. Despite this rigorous selection, however, there are not enough universities and higher schools to fill the requirements of the oncoming generation.

39. This lack of educational facilities is the basis for the expansion of existing universities and higher school equipment and the construction of new institutions of learning. The USSR is also endeavoring to overcome the distressing shortage of qualified instructors, realizing that the best wisdom of their teachers and educators is required to cultivate that combination of qualities and special talents which produce good scientists. And, in conclusion, scientists and engineers are offered high salaries and other economic privileges. The USSR is working more intensively than any other nation in history to resolve the difficulties which have heretofore hindered the progress of Soviet research and development and it is expected that in time a reserve of well-trained graduates of the higher schools will be built up to meet all demands of future scientific progress.
40. Once this educational goal has been achieved, the Soviet state will have the firm foundation required for a basic research program in all sciences. With a reserve of trained scientists, combined with the Soviet advantage of controlling personnel concentration upon problems of interest, there is a definite possibility that the Soviets may surpass other countries in "pure" or basic research, at which time the danger of Soviet transcendence in all fields will arise. An exact forecast of the onset of this Soviet superiority is, of course, difficult. [redacted] the establishment of an all-inclusive research program in the USSR will not begin before another six to eight years. Once this planned commitment of scientists in all research fields gains momentum, however, a rapid overtaking of Western science is to be expected, especially as there are no economic restrictions to be overcome. Pecuniary resources for such purposes will then be available in unlimited amounts. 50X1-HUM
41. The achievement of this goal is dependent upon the hindering factors mentioned—the lackadaisical attitude of the Soviet worker and the present one-sided training received by their scientists. Should these factors be overcome, however, there is the greatest danger that the Western countries will lose their present scientific and technical superiority to the Soviets. Western predominance is decreasing from day to day, [redacted] 50X1-HUM  
[redacted] the menace of this danger from the East is not being underestimated. 50X1-HUM

S E C R E T